Citation:

Wengreen HJ, Moncur C. Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutr J.* 2009;8:32.

PubMed ID: 19624820

Study Design:

Prospective cohort study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine changes in weight, dietary intake and other health related behaviors among first-year college students attending a public university in the western United States.

Inclusion Criteria:

- First year college students who attended high school during the previous year
- Not pregnant
- 18-19 years of age

Exclusion Criteria:

- Pregnant women
- Energy intakes of <500 calories or >6000 calories

Description of Study Protocol:

Recruitment

- 186 college freshmen in their first semester of college were recruited from private universities

Design

- A longitudinal observational study was conducted to examine changes in weight, dietary intake and other health related behaviors among first-year college students attending a public university in the Western United States.
- Participants completed surveys about dietary intake, physical activity and other health-related behaviors during the last six months of high school (Jan-June 2005) in August 2005 and during their first semester of college (Aug-Dec 2005).

- Weight was measured at the beginning and end of fall semester (Aug-Dec 2005).
- Participants were asked to report about their self-perceived health and health behaviors that included use of dietary supplements, breakfast consumption, alcohol use and smoking, and number of meals eaten per week at convenience or fast food type dining establishments and on campus dining facilities.
- Participants also categorized their parents as being currently underweight, of a healthy weight, overweight or obese.

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Means and standard deviations were used to describe the distribution of continuous variables. Analysis of variance (ANOVA) an extension of the two sample t test and Chi-squared distributions were used to compare means and percentages across weight status and weight gain groups.
- A repeated-measures ANOVA was used to examine the difference in mean height, weight and BMI measured in August 2005 and in December 2005.
- All statistical tests conducted were two-sided with a type I error (α) of 0.05 and P values <0.05 were considered statistically significant.

Data Collection Summary:

Timing of Measurements

- August 2005
- December 2005
- Participants completed surveys about dietary intake, physical activity and other health-related behaviors during the last six months of high school (Jan-June 2005) in August 2005 and during their first semester of college (Aug-Dec 2005).
- Weight was measured at the beginning and end of fall semester (Aug-Dec 2005).

Dependent Variables

- Change in BMI (BMI ≥ 25 and < 25)

Independent Variables

- Dietary intake
- Physical activity
- Meal pattern
- Sleep
- Participants were asked to report about their self-perceived health and health behaviors that included use of dietary supplements, breakfast consumption, alcohol use and smoking, and number of meals eaten per week at convenience or fast food type dining establishments and on campus dining facilities.
- Participants also categorized their parents as being currently underweight, of a healthy weight, overweight or obese.

Control Variables

Description of Actual Data Sample:

Initial N: 200 freshmen from the Freshmen Health study

Attrition (final N):

- 186 college freshmen (68 men and 118 women) completed the first assessment (Aug 2005)
- 159 completed (102 women and 57 men) the second assessment (Dec 2005)

Age: 18-19 y

Ethnicity: White-non-Hispanic (97%) and others

Other relevant demographics:

Anthropometrics

Location: Western United States

Summary of Results:

Key Findings

- More women (63%) than men (37%) participated in the study.
- Gender was neither associated with prevalence of a BMI≥ 25 upon entering college (p=0.146) nor risk of weight gain during the first semester of college (p=0.251).
- 97% were non-Hispanic white.
- Subjects with a BMI ≥ 25 reported being less healthy than were those with a BMI <25 (p value 0.003, <0.001, respectively).
- BMI of ≥ 25 were more likely to report their mothers but not their fathers as being overweight than were those with a BMI of <25 (p value 0.006, 0.146, respectively).
- No significant change in height (p=0.615), both weight and BMI increased from August to December (p=<0.001 for both).
- Average weight change during this period was 1.51±2.3 kg
- There was no significant difference in the amount of weight gained by men and women (p=0.235).
- Men were on average taller than women, average change in BMI was different for men and women (p=0.048).
- Men increased in BMI by an average 0.33 (±0.84) points and women increased in BMI by an average 0.60 (±0.77) points.
- 159 students completed both assessments (N=102 women and 57 men).
- The average BMI at the baseline assessment was 23.0±3.8.
- The average amount of weight gained during the 15 week study was a modest 91.5 kg.
- 23% of students gained ≥ 5% of their baseline body weight.
- Average weight gain among those who gained ≥5% of baseline body weight was 4.5 kg.
- Students who gained body weight reported less physical activity during college than high school, were more likely to eat breakfast and slept more than were those who did not gain ≥ 5% body weight.
- The cut-off of ≥ 5% of body weight represented the 78% percentile for the distribution of

weight change among study participants.
- The total percent of participants with BMI ≥25 increased from 20% at the beginning of fall semester to 23% at the end of fall semester (p=0.004).
- 14 participants were excluded due to implausible energy intakes of <500 calories or >6000 calories upon entering college and 9 participants excluded in the second assessment (Dec 2005).

Author Conclusion:

- Almost one quarter of students gained a significant amount of weight during their first semester of college. Several factors are certainly involved.
- This study provides further evidence that the transition to college life is a critical period of risk for weight gain and college freshmen are an important target population for obesity prevention strategies.
- Targeted information about maintaining energy balance through regular physical activity and appropriate energy intake from a healthy balanced diet, delivered to students at the outset of their college career, may be effective in preventing weight gain among college freshmen during this critical period.
- Venues for targeted education may include orientation sessions, residence halls and point of purchase education in dining facilities.
- This research provides further support for the implementation of education or other strategies aimed at helping young-adults entering college to achieve or maintain a healthy body weight.

Reviewer Comments:

Relatively small sample with more women than men for a longitudinal study, and predominantly white non-Hispanic subjects. Authors note the following limitations:

- *Participants with BMI > 25 at the baseline interview were more likely to drop out of the study than were those with BMI < 25*
- *Diet and physical activity were assessed with instruments that relied on the accurate memory recall of usual behaviors by participants*
- *Since body composition was not assessed, it cannot be determined whether the observed increases in body weight were associated with growth or increases in lean or non-lean body mass*
- *Participants were non-Hispanic white (91%) and report lower rates of smoking and drinking than reported nationally*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A

2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	No
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	No
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes